

REMARKS/ARGUMENTS

Claims 1-7, 9-15, 17-19, and 25-29 are pending. Claims 8, 16, and 20-24 are canceled. Claims 26-29 were deemed withdrawn by the Examiner pursuant to the restriction requirement in the current Office Action.

I. Restriction Requirement, With Traverse

The Examiner asserts that:

Newly submitted claims 26-29 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: the product as in Claims 26-29, i.e. green part and/or sintered part, can be made by another materially different process, for example by sintering with an organic binder as taught in US 5,745,834.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 26-29 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Office Action of July 9, 2008, p. 2.

This restriction requirement is traversed on two grounds. First, claim 1 is generic to claim 26-29 because claims 26-29 depend from claim 1. Therefore, if claim 1 is held to be allowable, then claims 26-29 should also be allowed.

Second, the Examiner mischaracterized claims 26-29 as being products. Claims 26-29 are still fundamentally method claims, not product claims as asserted by the Examiner. The fact that the claims are further limited by reference to what objects are acted upon does not change the fact that these claims are method claims. Thus, again because claims 26-29 depend from claim 1, claim 1 is a generic claim. Hence, again, if claim 1 is held to be allowable, then claims 26-29 should also be allowable.

II. 35 U.S.C. § 103: Asserted Obviousness

The Examiner rejects claims 1 and 2 as obvious under 35 U.S.C. § 103 in view of *Lorenz, et al.*, Techniques for Infiltration of a Powder Metal Skeleton by a Similar Alloy With Melting Point Depressed, U.S. Patent 6,719,948 (April 13, 2004) (hereinafter “*Lorenz*”) in view of

Feldstein, Methods for Alloy Migration Sintering, U.S. Patent 5,248,475 (September 28, 1993) (hereinafter "*Feldstein*"). This rejection is respectfully traversed.

Applicants first address the rejection of claim 1. In rejecting claim 1, the Examiner states that:

Lorenz et al teaches forming a skeleton or green part from powder metallurgy. Further processing includes using an infiltrant with a melting point depressant (MPD). The MPD diffuses into the skeleton, the liquid undergoes a diffusional solidification and the material eventually solidifies. Regarding melting the alloying metal, the infiltrant has a composition similar to that of the skeleton (column 2, lines 32-48 and column 3, lines 16-23). The powder metallurgy process to make the skeleton produces a homogeneous net shape (column 3, lines 4- 6). Titanium alloys can be used in this process (column 23, lines 45-50). The infiltrant is molten (column 3, line 29); the composition of the melt is established by, *inter alia*, separating the infiltrant from the melt prior to infiltration and adding excess skeleton material to the melt (lines 36-38). Regarding Claim 2, the alloying element with Ti includes Sn (column 23, line 52). However, Lorenz et al does not disclose the steps of spreading, directing, re-solidifying, and brushing as in Claim 1.

Feldstein teaches a method for fabricating a sintered and solid element. The steps include, *inter alia*, coating discrete pieces of an "unsinterable" material with an alloying agent, exposing the discrete pieces to heat so that localized melting occurs to form molten surfaces on the discrete particles, and removing the heat away from the element (column 5, lines 1-46). Regarding the step of spreading, Feldstein teaches packing the discrete particles onto a backing and supporting structure (column 5, lines 3-5), such as a substrate (column 6, lines 20 and 21). Regarding the step of directing, the step of exposing the discrete particles so that localized melting occurs reads on the claimed step. Regarding the step of resolidifying, heat is removed and the sintered and solid element is allowed to cool (column 5, lines 45 and 46). The heat source is not specified in Feldstein, but the disclosed controlled heating reads on an energy beam, since an energy beam is a source of heat, and Feldstein teaches the same result of localized melting. Regarding the step of brushing, it would have been obvious to one of ordinary skill in the art at the time the invention was made to clean excess powder while fabricating a piece for further processing. Titanium-based alloys can be used with alloying agents such as Sn and Ni (lines 55-58). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the fabricating technique in Feldstein for the skeleton in Lorenz et al, since Feldstein teaches that the alloyed element concentration profile can be controlled, distribution is optimized, and costs of production are minimized (column 4, lines 11-18).

Office Action of July 9, 2008, pp. 2-4.

The Examiner bears the burden of establishing a *prima facie* case of obviousness based on prior art when rejecting claims under 35 U.S.C. § 103. *In re Fritch*, 972 F.2d 1260, 23 U.S.P.Q.2d 1780 (Fed. Cir. 1992). The prior art reference (or references when combined) must teach or suggest all the claim limitations. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). In determining obviousness, the scope and content of the prior art are... determined; differences between the prior art and the claims at issue are... ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background the obviousness or non-obviousness of the subject matter is determined. *Graham v. John Deere Co.*, 383 U.S. 1 (1966). “Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR Int’l. Co. v. Teleflex, Inc.*, No. 04-1350 (U.S. Apr. 30, 2007). “Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. *Id.* (citing *In re Kahn*, 441 F.3d 977, 988 (CA Fed. 2006)).”

Claim 1 is as follows:

1. (Previously Presented) A method for selective sintering a powder, the method comprising:
 - spreading a layer of a powder blend on a platform, said powder blend comprising:
 - a base metal of titanium or alloy thereof, the base metal having a first melting temperature, and
 - an alloying metal having a second melting temperature lower than said first melting temperature, wherein the base metal and alloying metal are selected, and quantitatively included in the powder blend, based on a characteristic of the base metal to dissolve in but not react with the alloying metal when the alloying metal is liquefied at an annealing temperature between the first and second melting temperatures, and wherein said powder blend does not include a carbon-based polymer;
 - directing an energy beam onto a localized portion of the layer of the powder blend and thereby melting said alloying metal in the localized portion; and

re-solidifying said alloying metal by withdrawing said energy beam from said powder blend layer, and thereby binding said base metal or alloy thereof with said alloying metal in a metallic mixture in the localized portion, wherein a green part is formed;
thereafter brushing off excess powder from the green part;
heating the green part at a temperature sufficient to melt said alloying metal and dissolve the base metal therein to form a hyper-eutectic liquid composition; and
after the hyper-eutectic liquid composition is formed, cooling the hyper-eutectic liquid composition to form a sintered part.

II.A. The Examiner Failed to Address How the Combination Teaches the Claim Features

As with the prior Office Action, the Examiner failed to specify how the cited references teach the claim features. Generally, the Examiner only describes what the Examiner asserts the references to teach. Generally, the Examiner does not actually compare the teachings of the references to the precise language of the claims. On this basis alone, the Examiner failed to state a *prima facie* obviousness rejection against claim 1 or any other claim.

In those few cases where the Examiner actually addresses claim language, the Examiner does not address the *whole claim language*. Instead, the Examiner only takes a general word from the claim and then address that general word, rather than considering the actual claim language or the claim as a whole. For example, the Examiner refers to, “regarding the step of directing,” rather than, “directing an *energy beam* onto a localized portion of the layer of the powder blend,” as actually claimed. The Examiner also refers to “regarding the step of brushing,” rather than, “brushing off excess powder from the green part,” as in claim 1.

The Examiner’s failure to consider the actual claim language is a non-trivial failure because, in only describing references and then assuming that the references teach the required claim features, the Examiner effectively ignores claim features. The Examiner may not ignore features of the claims. *In re Lowry*, 32 F.3d 1579, 1582, 32 U.S.P.Q.2d 1031, 1034 (Fed. Cir. 1994) (All limitations of the claimed invention must be considered when determining patentability.)

The Examiner also relies on conclusory statements that are completely unsupported. This action is specifically forbidden by the United States Supreme Court. “*Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.*” *KSR Intl.* For example, the Examiner states that, “Regarding the step of brushing,

it would have been obvious to one of ordinary skill in the art at the time the invention was made to clean excess powder while fabricating a piece for further processing.” However, the Examiner provides no basis or support for this assertion, but rather offers the Examiner’s unsupported personal opinion as a substitute. The Examiner may not do so. *KSR Intl.* Additionally, the Examiner should always provide documentary evidence. MPEP § 2144.03. In another example, the Examiner states that “the disclosed controlled heating reads on an energy beam, since an energy beam is a source of heat.” This assertion is both manifestly wrong and also unsupported personal opinion that fails to comply with MPEP § 2144.03.

Because the Examiner has not addressed the actual claim features, has not considered the claim as a whole, and has made unsupported assumptions of personal opinion, the Examiner failed to state a *prima facie* obviousness rejection against claim 1 or any other claim.

II.B. The Proposed Combination, Considered as a Whole, Does Not Teach or Suggest All of the Features of Claim 1

Additionally, no *prima facie* obviousness rejection can be stated against claim 1 as amended using a combination of *Feldstein* and *Lorenz* considered as a whole because the proposed combination does not teach or suggest all of the features of claim 1 as amended. Specifically, the combination of *Lorenz* and *Feldstein* does not teach or suggest, “spreading a layer of a powder blend on a platform,” “directing an energy beam onto a localized portion of the layer of the powder blend and thereby melting said alloying metal in the localized port,” and “thereafter brushing off excess powder from the green part.”

II.B.1. The Combination Does Not Teach or Suggest Spreading

The proposed combination of *Feldstein* and *Lorenz*, considered as a whole, does not teach or suggest “spreading a layer of a powder blend on a platform,” as in claim 1. The Examiner admits that *Lorenz* does not teach this feature. However, the Examiner asserts that *Feldstein* does teach this feature.

Generally, *Feldstein* is directed to a method for sintering what was formerly considered unsinterable material. *Feldstein*, Abstract. The process of *Feldstein* is succinctly summarized by the following steps:

(a) coating discrete pieces of the unsinterable material with a thin coating of the alloying agent;

(b) packing the discrete pieces into a position--a bounded volume, or onto a backing and supporting structure, for example--where the coated grains are to be sintered so as to form the sintered and solid element being fabricated;

(c) exposing the discrete pieces to a source of heat so that at least the coating and the regions of those discrete pieces just below the alloying agent coating on those discrete pieces is slowly raised in temperature towards a first temperature below which plastic deformation of the underlying unsinterable material will occur--its slump temperature--so that diffusion of the alloying agent into the discrete pieces of the unsinterable material will thereby occur and so as to thereby form diffusion regions at the interface of the coating and the unsinterable material, with a eutectic composition of the alloying agent and the unsinterable material occurring within the diffusion regions;

(d) thereafter, further exposing the discrete pieces of unsinterable material to sufficient heat that at least the diffusion regions of those discrete pieces increase in temperature to a second temperature which is slightly above the eutectic melting point, whereby localized melting and thickening of the diffusion regions occurs so as to form molten surfaces on the discrete pieces that comprise substantially isothermal eutectic compositions, stabilized by the heat of fusion and thickened by further heat absorption, whereby adjacent grains begin to share the localized melting regions and become mutually wet;

(e) maintaining the second temperature substantially constant, whereby the alloying agent continues to diffuse, thereby lowering the concentration of the alloying agent in the molten surfaces and raising the melting point thereof, so as to cause the molten surfaces to re-solidify, so that the wetted melted regions will freeze and adjacent discrete pieces of the unsinterable material will bond one to another, thereby achieving fabrication of a sintered and solid element of the unsinterable material; and

(f) thereafter, removing the then fabricated sintered and solid element away from the heat, or removing the heat away from the sintered and solid element, so that the sintered and solid element is permitted to cool.

Feldstein, col. 5, ll. 1-49 (emphasis supplied to show portions cited by the Examiner).

Step (b) refers to packing discrete pieces to be sintered. Packing is not “spreading as claimed.” Thus, the Examiner’s citation is misplaced.

Of greater importance to the claim feature at issue, in step (a) *Feldstein* coats discrete pieces of unsinterable material with a thin coating of an alloying agent. This teaching is completely different than, “spreading a layer of a powder blend on a platform,” as in claim 1. Whereas *Feldstein* coats discrete pieces, claim 1 spreads a layer of powder. On their face, the teaching of *Feldstein* is completely distinct from the requirements of claim 1.

Nevertheless, the Examiner refers to the following portions of *Feldstein* as teaching these features:

In general, fabrication may first be preceded in step (b) *by placing at least a portion of the coated discrete pieces or particles of the unsinterable material on a substrate and heat bonding that portion of the coated discrete pieces or particles of unsinterable material to the substrate*, followed by further placement of the remaining amount of the unsinterable material. The first sintered layer that exists at this point may have an additional quantity of the alloying agent coated or plated onto it. Still further, the heat bonding may be heat and pressure bonding, since "cold flow" of many materials becomes more efficient as the lower limit of the plastic flow range of that material is approached.

Feldstein, col. 6, ll. 18-30 (emphasis supplied to show portions cited by the Examiner).

Again, the Examiner has mischaracterized the reference and the claims. Claim 1 requires, “spreading a layer of a powder blend on a platform.” As a first matter, *Feldstein* teaches placing, which is not necessarily spreading. As a second matter, *Feldstein* teaches placing the discrete pieces on the substrate and then heat bonding that portion to the substrate. These discrete pieces are not a “powder blend,” as claimed, so the claim feature is again not met.

Also, the Examiner has ignored the context of this disclosure. Referring back to step a) of *Feldstein* “coats discrete pieces of unsinterable material with a thin coating of an alloying agent.” This teaching gives context to “placing,” as described in col. 6. Again, coating is not the same as spreading, and the claimed powder blend is not the same as the alloying agent (a single substance), as in *Feldstein*.

Still further, the Examiner has ignored the context of the claim. The step of spreading the powder blend does not stand by itself, but rather falls within claim 1 considered as a whole. As a whole, claim 1 requires placing a powder blend to be melted together on a platform and then taking the claimed steps. In contrast, *Feldstein* places a singular alloying agent on an unsinterable material and then melting the alloying agent onto the unsinterable material. Fundamentally, these processes are different. Thus, utterly no reason exists to assert that the

combination of references actually results in the claimed invention, much less that the combination of references would render the claims obvious.

In any case, *Feldstein* does not teach or suggest the spreading feature of claim 1. The Examiner admits that *Lorenz* does not teach or suggest this claimed feature. Therefore, the proposed combination, considered as a whole, does not teach or suggest this claimed feature. Accordingly, under the standards of *In re Royka*, the Examiner failed to state a *prima facie* obviousness rejection against claim 1.

II.B.2. The Combination Does Not Teach or Suggest Directing an Energy Beam

Additionally, the proposed combination does not teach or suggest the claimed feature of “directing an energy beam onto a localized portion of the layer of the powder blend and thereby melting said alloying metal in the localized port,” as in claim 1. The Examiner has maintained the same erroneous assumption, stating:

The heat source is not specified in *Feldstein*, but the disclosed controlled heating reads on an energy beam.

Office Action of July 9, 2008, p. 3.

The Examiner has no basis to assume that controlled heating reads on an energy beam. In view of the fact that controlled heating in the art of sintering is usually performed using a furnace, welding torch, plasma spray, or similar non-beam heating mechanism, the Examiner’s assumption is actually unreasonable under the circumstances. Most importantly, neither reference actually teaches or suggests this claimed feature; therefore, under *In re Royka*, the Examiner failed to state a *prima facie* obviousness rejection against claim 1.

Additionally, *everyone* of skill in the art knows that an energy beam is radically different than application of diffuse heat, as in *Feldstein* or *Lorenz*. The Examiner’s assertion otherwise unnaturally twists the meaning of words; thus, the Examiner’s construction of claim 1 and the references is, again, unreasonable. Accordingly, the proposed combination, considered as a whole, does not teach or suggest all of the features of claim 1, even when the claims and the references are interpreted as broadly as reasonably possible.

Additionally, neither *Lorenz* nor *Feldstein* teach or suggest the claimed feature of directing the energy beam onto a “*localized portion*” of the claimed powder layer, as not recited in amended claim 1. The Examiner’s assertion to the contrary is plainly wrong. Thus, no *prima*

facie obviousness rejection can be stated against claim 1 using a combination of the cited references.

II.B.3. The Combination Does Not Teach “Brushing”

Additionally, the combination does not teach or suggest the newly added claim feature of, “thereafter brushing off excess powder from the green part,” as in claim 1. This requirement of claim 1 simply is not taught or suggested in either reference. Therefore, no *prima facie* obviousness rejection can be stated against claim 1 using a combination of the cited references.

The Examiner asserts without foundation or support that such a step would have been obvious. The Examiner provides no reason why adding such a step in the context of the combination would be obvious. Additionally, the Examiner should always provide documentary evidence. MPEP § 2144.03. Thus, the Examiner failed to state a *prima facie* obviousness rejection against claim 1.

Still further, the fact remains that the proposed combination does not actually teach or suggest this claimed feature. Thus, under the standards of *In re Royka*, the Examiner failed to state a *prima facie* obviousness rejection against claim 1.

II.C. *Feldstein* Teaches Away from Claim 1

Additionally, the Examiner failed to state a *prima facie* obviousness rejection against claim 1 because *Feldstein* teaches away from claim 1. A reference may be said to “teach away” from the claimed invention when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant. *In re Gurley*, 27 F.3d 551, 553, 31 U.S.P.Q.2D 1130, 1131 (Fed. Cir. 1995).

In this case, *Feldstein* teaches coating only discrete portions of the part to be sintered. For example, *Feldstein* teaches, “(a) coating discrete pieces of the unsinterable material with a thin coating of the alloying agent.” *Feldstein*, col. 5, ll. 1-2 (emphasis supplied). Coating discrete pieces of material is manifestly contrary to spreading a powder, as claimed.

Thus, *Feldstein* would lead one of ordinary skill in a direction divergent from the path that was taken by claim 1. Accordingly, under *In re Gurley*, *Feldstein* teaches away from claim

1. Therefore, no *prima facie* obviousness rejection can be stated against claim 1 using a combination containing *Feldstein*.

II.D. The Examiner Failed To State a Proper Reason To Achieve the Legal Conclusion of Obviousness of Claim 1 under the Standards of *KSR Intl.*

The Examiner states that:

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the fabricating technique in *Feldstein* for the skeleton in *Lorenz et al*, since *Feldstein* teaches that the alloyed element concentration profile can be controlled, distribution is optimized, and costs of production are minimized (column 4, lines 11-18).

Office Action of July 9, 2008, p. 4.

The Examiner asserts that using the fabricating technique in *Feldstein* in *Lorenz* would be obvious. However, the Examiner does not state a rational underpinning to achieve the legal conclusion of obviousness with respect to claim 1. “Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. *KSR Int’l. Co. v. Teleflex, Inc.*, 127 S. Ct. 1727 (April 30, 2007) (citing *In re Kahn*, 441 F.3d 977, 988 (CA Fed. 2006)).”

In this case, the Examiner only provides a reason to combine *Feldstein* and *Lorenz*. The Examiner provides no reason to achieve the legal conclusion of obviousness of claim 1 in view of these references. The question of combining *Feldstein* and *Lorenz* is irrelevant. The question of whether claim 1 is obvious in view of the references considered as a whole is what is relevant.

In this case, no rational underpinning exists to achieve the legal conclusion that claim 1 is obvious in view of the references considered as a whole. *Lorenz* is directed to infiltration of a powder into a metal skeleton. *Feldstein* is directed to methods for sintering individual portions of unsinterable material. Given that *Feldstein* relies on coating discrete portions of a substance and *Lorenz* relies on infiltrating a three-dimensional structure, no reason can exist to assume that *Feldstein* and *Lorenz* can be technically combined in the first place.

Note that the Examiner relies on a purported advantage to combine *Feldstein* and *Lorenz*. However, the Examiner ignores the fact that *Feldstein* and *Lorenz* cannot be technically

combined in the first place; therefore, the Examiner's asserted reason to combine the references is both incorrect and irrelevant.

In any case, the Examiner failed to state a proper reason to achieve the legal conclusion of obviousness of claim 1 under the standards of *KSR Intl.* Accordingly, the Examiner failed to state a *prima facie* obviousness rejection against claim 1.

II.E. Claim 2, 9, 10, and 17

Claims 2, 9, 10, and 17 all contain features similar to those presented in claim 1. Therefore, no *prima facie* obviousness rejection can be stated against the remaining claims at least for the reasons presented above.

II.F. Refutation of the Examiner's Responses

In response to the facts presented above, the Examiner states that:

Applicant argues that the Examiner does not show how *Feldstein* teaches the steps of spreading, directing, and resolidifying. Those steps are addressed in this Office Action. Regarding the energy beam, an energy beam is a source of heat. Any energy source that can perform the same function of localized melting reads on the claimed heat source.

Office Action of July 9, 2008, p. 10.

The Examiner still does not show how *Feldstein* teaches these steps because the Examiner does not actually refer to the precise language of the claims. As shown above, *Feldstein* does not actually teach these claim features, recited as they are in the claims.

Additionally, the Examiner's over-generalization of an energy beam as a mere source of heat unnaturally twists the plain meaning of claim terms. Everyone of ordinary skill in this art knows that an energy beam is vastly different than diffuse heating, as is described in *Feldstein* and *Lorenz*. An energy beam is a beam. Diffuse heating is diffuse heating. The fact that localized melting takes place in both claim 1 and the references is *irrelevant* to the differences between a beam and diffuse heating. The two techniques are *fundamentally different*, and for this reason, the claimed invention and the cited references approach the art from completely different directions. This fact actually proves that the combination is *prima facie non-obvious*.

Still further, the Examiner's assertion that "any energy source that can perform the same function of localized melting reads on the claimed heat source" is manifestly wrong. Even if the

result in the proposed combination were the same as the claimed result, an assertion Applicants disproved above, the claimed invention is taking a different technical approach than the cited combination. No possible rational underpinning can be stated that the claims are obvious in view of the combination of references when the claims take a completely different technical approach. Therefore, again, the Examiner failed to state *prima facie* obviousness rejections.

II.G. Remaining Rejections

The Examiner rejects the remaining claims as obvious in view of *Lorenz*, *Feldstein*, and other references, such as *Rongti* (claims 3 and 11); the *CRC Handbook of Chemistry and Physics* (claims 4, 5, 12, and 13); *Clement* (claims 6 and 9); *Clement* and the *CRC Handbook* (claims 7 and 15); and *Weiman* (claim 25). However, all of these claims contain features presented in claim 1, features that the proposed combination of *Lorenz* and *Feldstein* does not teach or suggest. Furthermore, *Rongti*, *Clement*, *Weiman*, and the *CRC Handbook of Chemistry and Physics* do not teach or suggest the features missing from *Lorenz* and *Feldstein*. Therefore, all of the proposed combinations fail to teach or suggest all of the features of the claims.

III. Conclusion

The subject application is patentable over the cited references and should now be in condition for allowance. The Examiner is invited to call the undersigned at the below-listed telephone number if in the opinion of the Examiner such a telephone conference would expedite or aid the prosecution and examination of this application.

DATE: September 10, 2008

Respectfully submitted,

/Theodore D. Fay, III/

Theodore D. Fay, III
Reg. No. 48,504
Yee & Associates, P.C.
P.O. Box 802333
Dallas, TX 75380
(972) 385-8777
Attorney for Applicants